The Combined Aerospace Operations Center (CAOC) Weapon System

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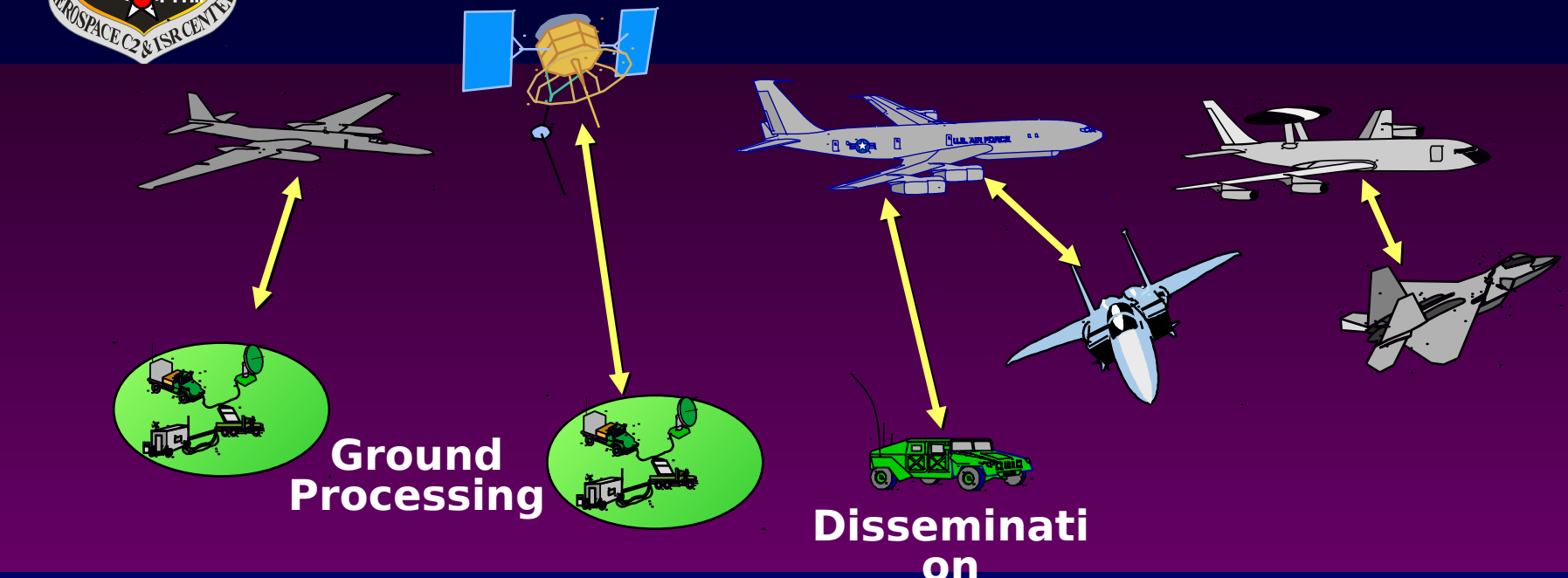
UNCLASSIFIE

Purpose

Describe CAOC and CAOC-Experimental (CAOC-X)

TODAY'S OPERATIONAL REALITY



- Individual stove-pipe systems
- Lack of bandwidth
- Labor intensive collection / coord
- Difficult to build recognized operational picture
- Little interoperability
- Large forward footprint
- Non-standard command and control (C2) centers
- Scattered snapshots of

Data Overloaded, Information Starved

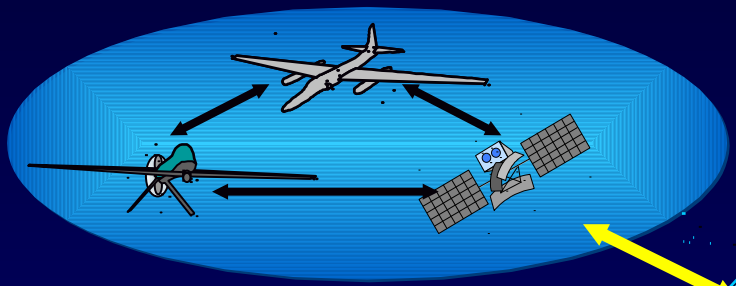
21st Century Operating Environment

Joint Vision 2010 and Scientific Advisory Board:

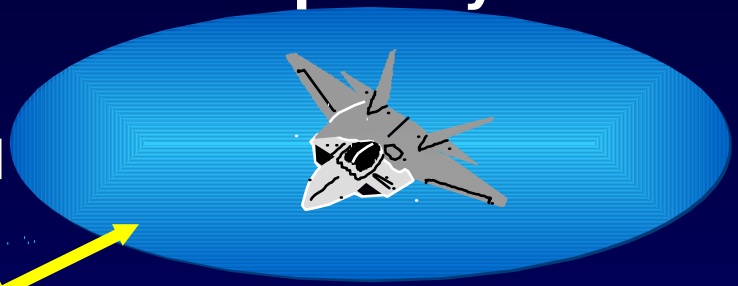
- **Interoperability - wider range of partners**
- **Time - reduced planning and execution time**
- **Reachback - “virtual staffs” expand and augment in-theater forces**
- **Information - increased access and availability**
- **Precision - information as well as weapons**

Future C2ISR Operations

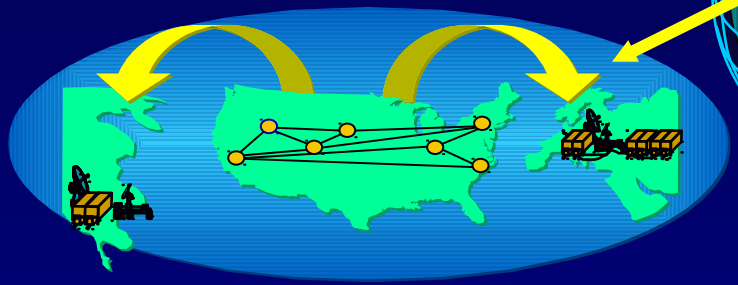
Sensors



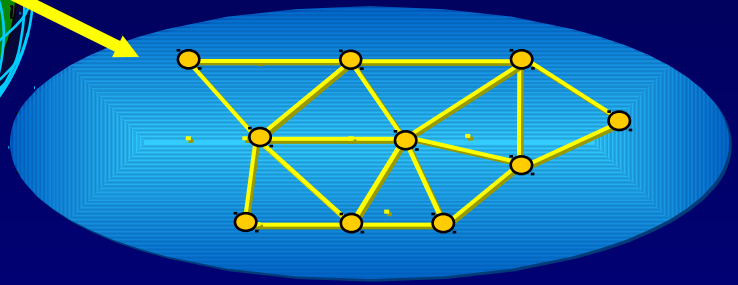
Weapon Systems



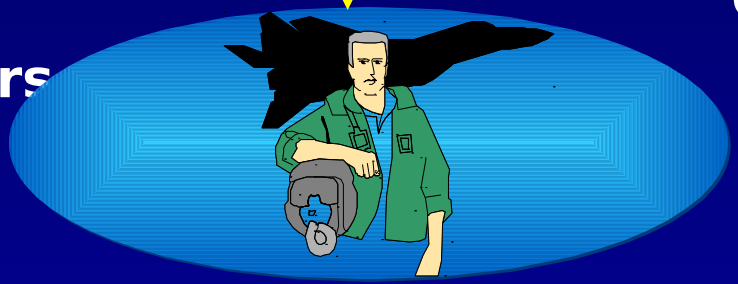
Global Grid



Processing & Exploitation Centers



C2 Centers



Aerospace Warriors

Mission

Lead organization to integrate and influence Air Force Command and Control & Intelligence, Surveillance, and Reconnaissance Primary tasks:

- **Modernization planning**
- **C2 & ISR operational requirements**
- **Resource prioritization**
- **Configuration control**
- **AF experimentation**

Ensure Air Force C2 & ISR Meets the Challenges of Global Engagement, Joint Vision 2010 and Beyond

AC2ISRC & ESC Relationship

Headquarters United States Air Force

Air Combat Command

AF Materiel Command

Aerospace C2 & ISR Center

Electronic Systems Center

Aerospace Operations Center

- The principal air operations installation from which aircraft and air warning functions of combat air operations are directed, controlled, and executed.
- It is the senior agency of the Air Force Component Commander from which command and control of air operations are coordinated with other components and Services.

Combined Aerospace Operations Cente

Assessment of Current Tools

Plan	Strategy
	Guidance, Apportionment & Targeting
	Master Air Attack Plan
	Air Tasking Order Production
Execute	Fixed Target
	Planned Dynamic
	Time Critical Targets
Assess	Operational Assessment
	Combat Assessment
	Process Assessment

Current capability adequate

Current capability limited

Currently no Integrated toolset

C2 Development Today
Summary

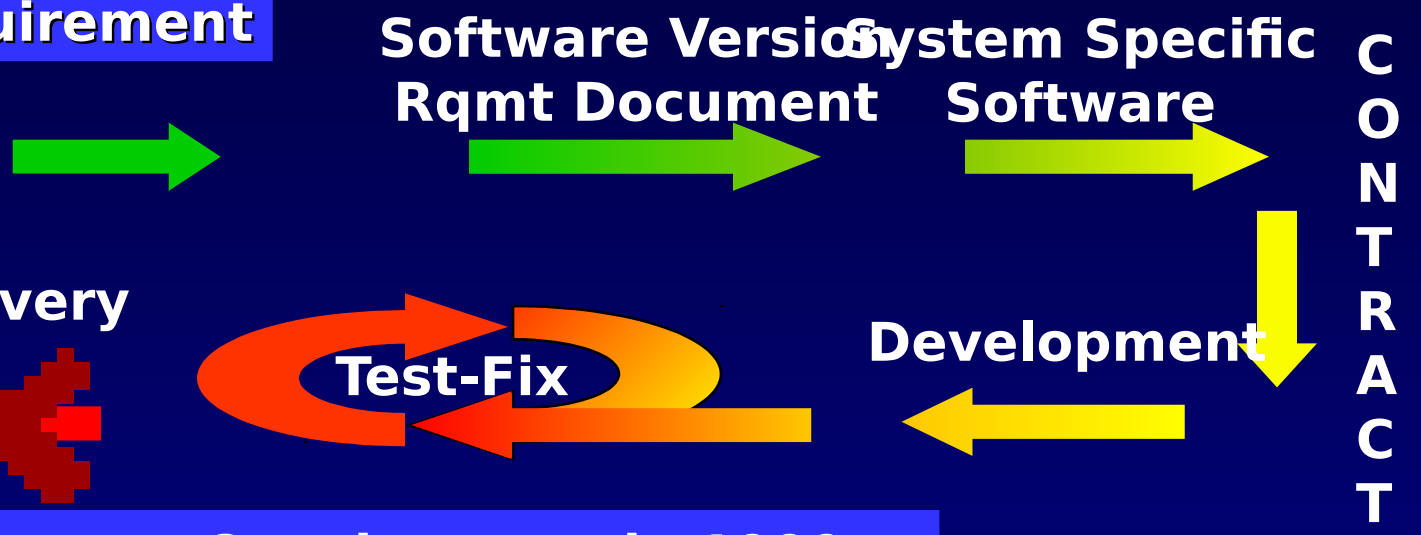
- Requirements freeze for contract execution
  - Non-responsive to new technology
  - User expectations change
  - User processes change
  - Testing based on 100% of original requirement set
- Contractor / govt team lacks consistent and repeatable operator involvement
- Users impatient–develop self-solutions

Result: process unresponsive and very slow

Legacy Development Cycle

Hundreds of users
Thousands of requirements

Developers translate requirements to solution



Too many tests: 8 major tests in 19[illegible]
Tests of marginal value due to chan[illegible] ops environment & users

Minimal user involvemen during development

Reality: capability delivery is delayed or never occurs

Avg: 3–5 YEAR delivery cycle

Combined Aerospace Operations Center – Experimental (CAOC-X)

A place and processes to rapidly develop

and field the AOC Weapon System

AOC Development
Where We Need To Go

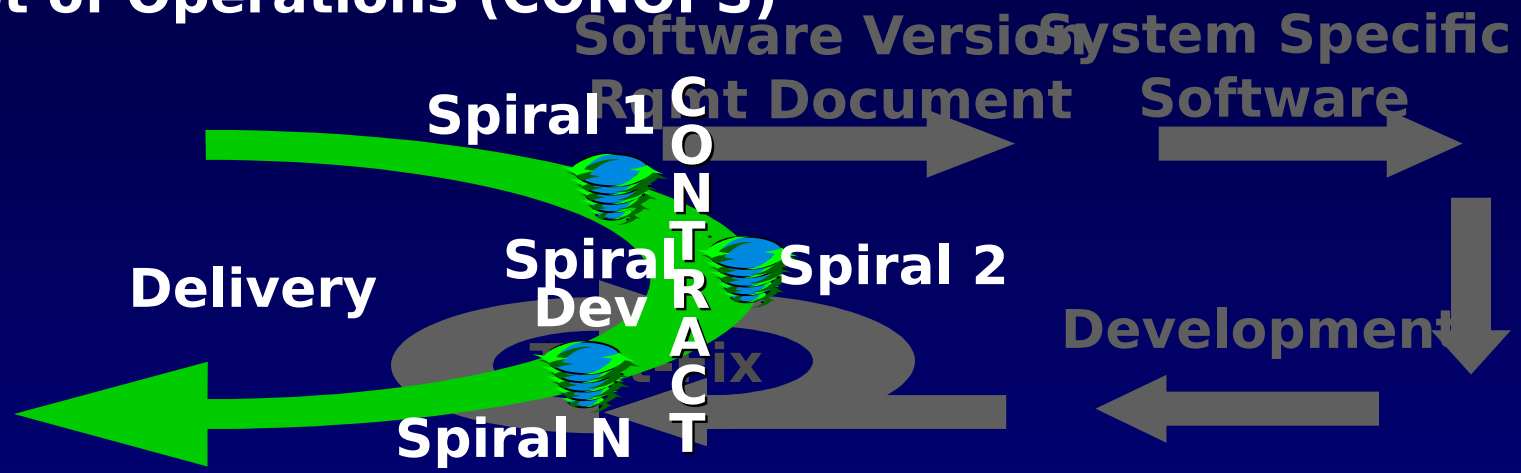
- Responsive to operational needs
  - Build AND test to commercial beta practice
  - Operators / developers / testers working together throughout concept, baseline, and fielding process
  - Refine in an operational environment with operators “hands on”
  - Rapid and responsive fielding
- Common look and feel: Users can customize their screens
- Joint / Allied interoperable
- Capable of expeditionary operations

Emerging Development Cycle

Hundreds of users
Thousands of requirements

Developers translate requirements to solution

Concept of Operations (CONOPS)



Too many tests: 8 major tests in 19
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ops environment & users

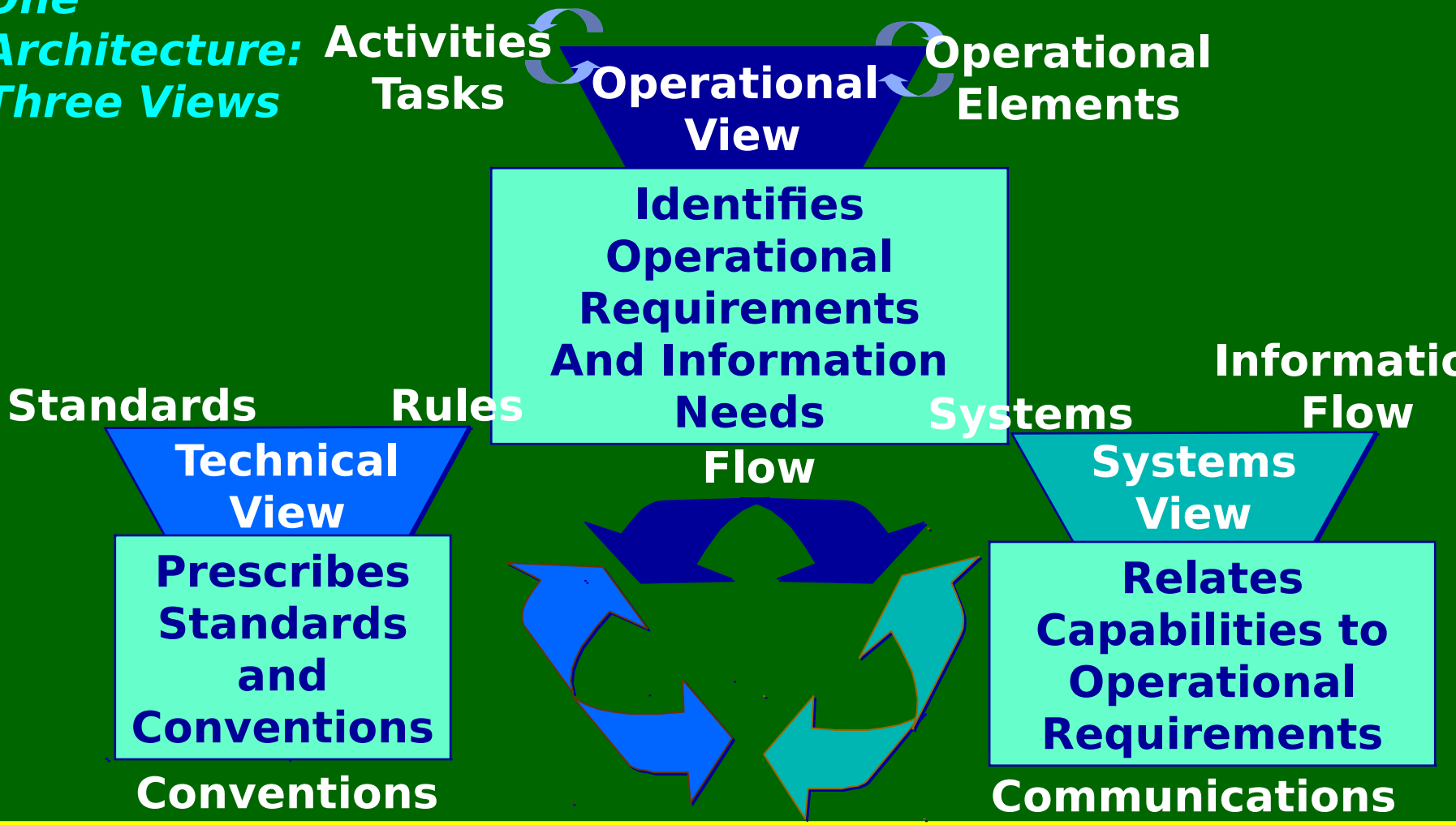
Minimal user involvemen
during development

Goal: continuous technical refresh & evolution

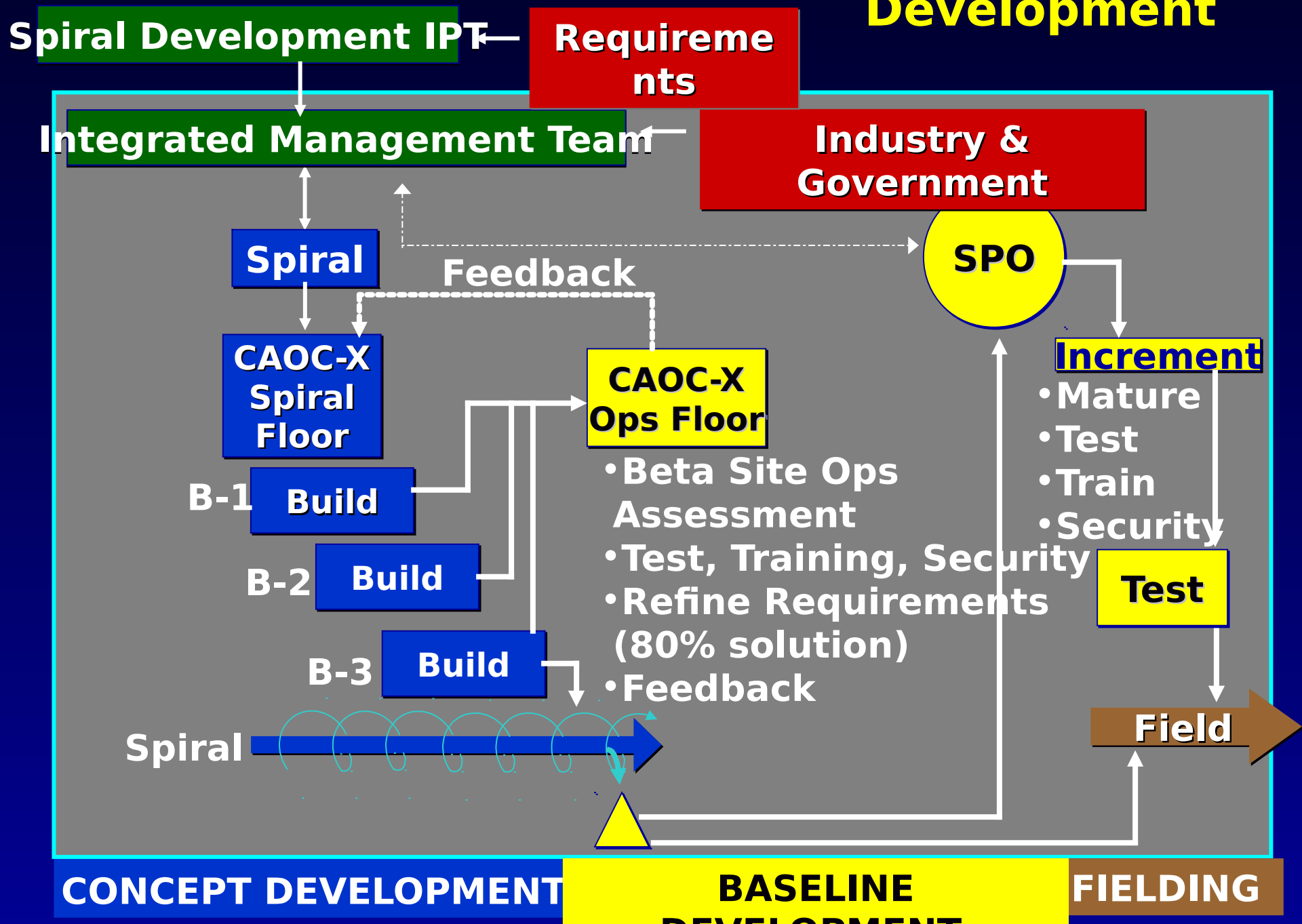
Development Process Foundation

Concept of Operations (CONOPS)

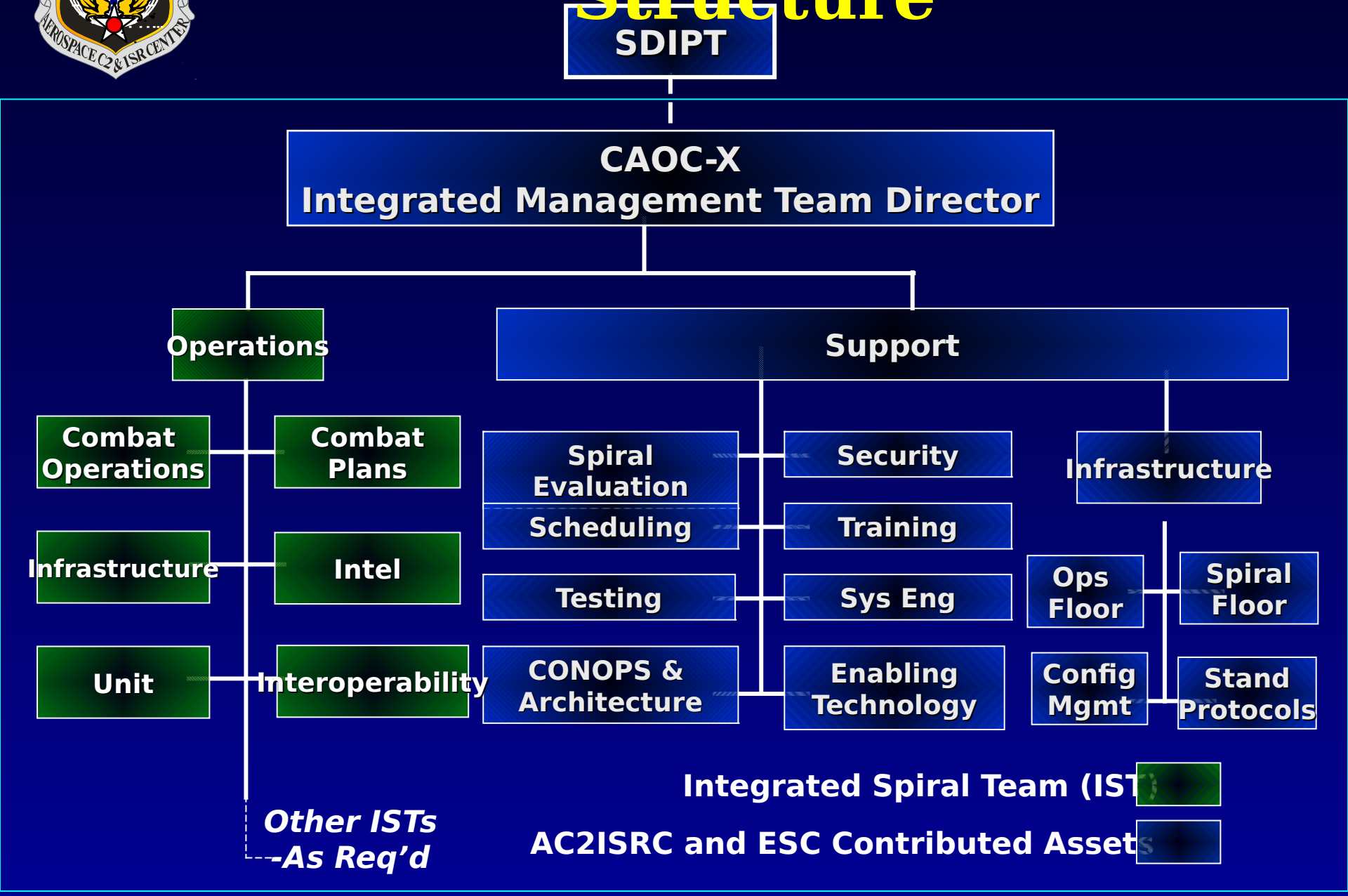
One Architecture: Three Views



Spiral Development



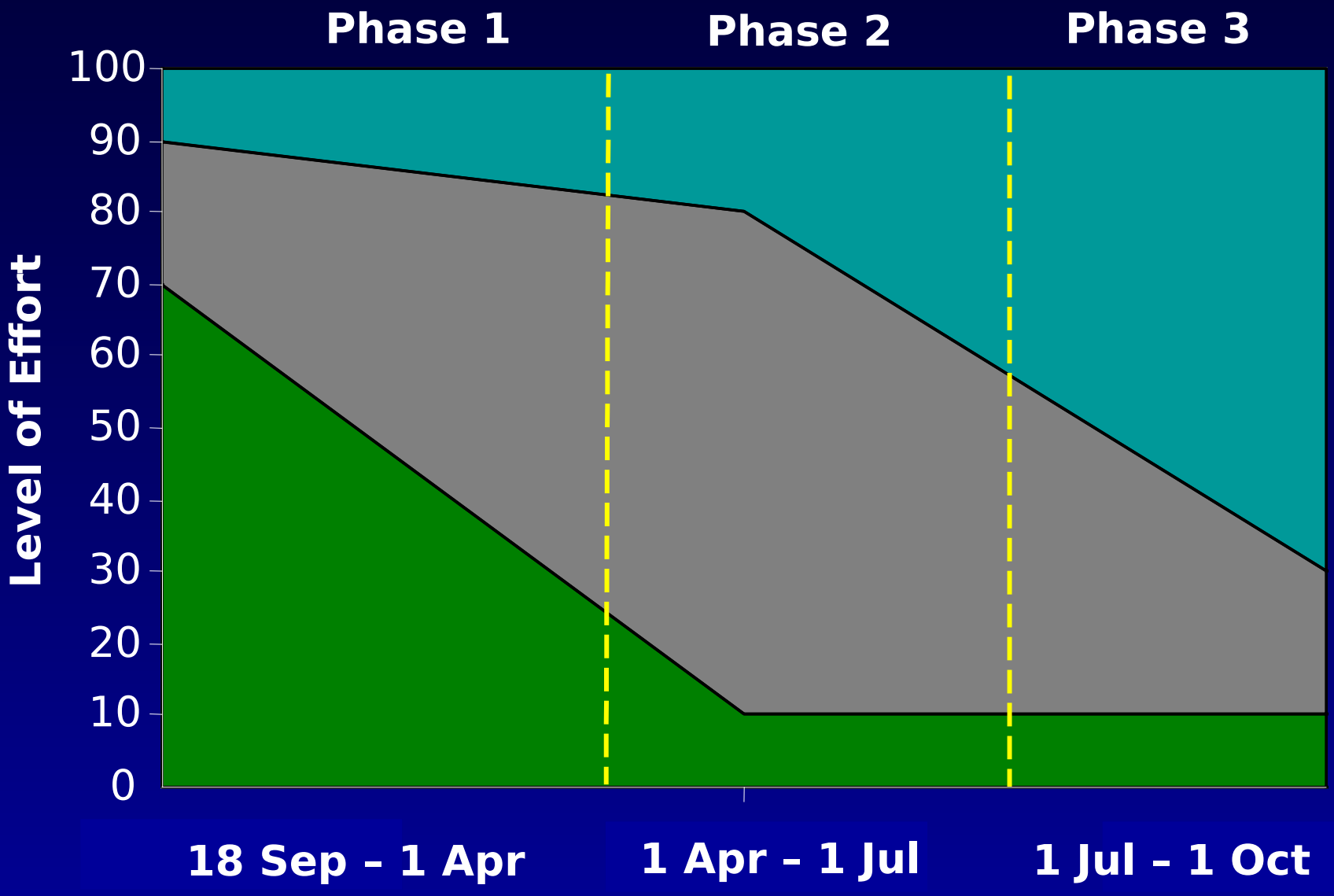
CAOC-X Management Structure



Current Activity

- Baselined the CAOC-X infrastructure
  - Theater Battle Management Core Systems (TBMCS) 27-server current configuration (Sourcing hardware)
  - Brought in NATO's Initial CAOC Capability (ICC) to assess options for TBMCS information exchange (Started 5 Oct)
  - Procured Master Battle Planner (MBP)—Spiraling integration of functionality into the TBMCS baseline (Conducting assessment)
  - Joint Services Work Station (JSWS) (Pending funding)
- TBMCS Server consolidation
  - Executed Spiral 1 with 4-server configuration
  - Encouraging results (Spiral 2 ongoing)

CAOC-X
Notional Phase Plan



CAOC-X Phase 1

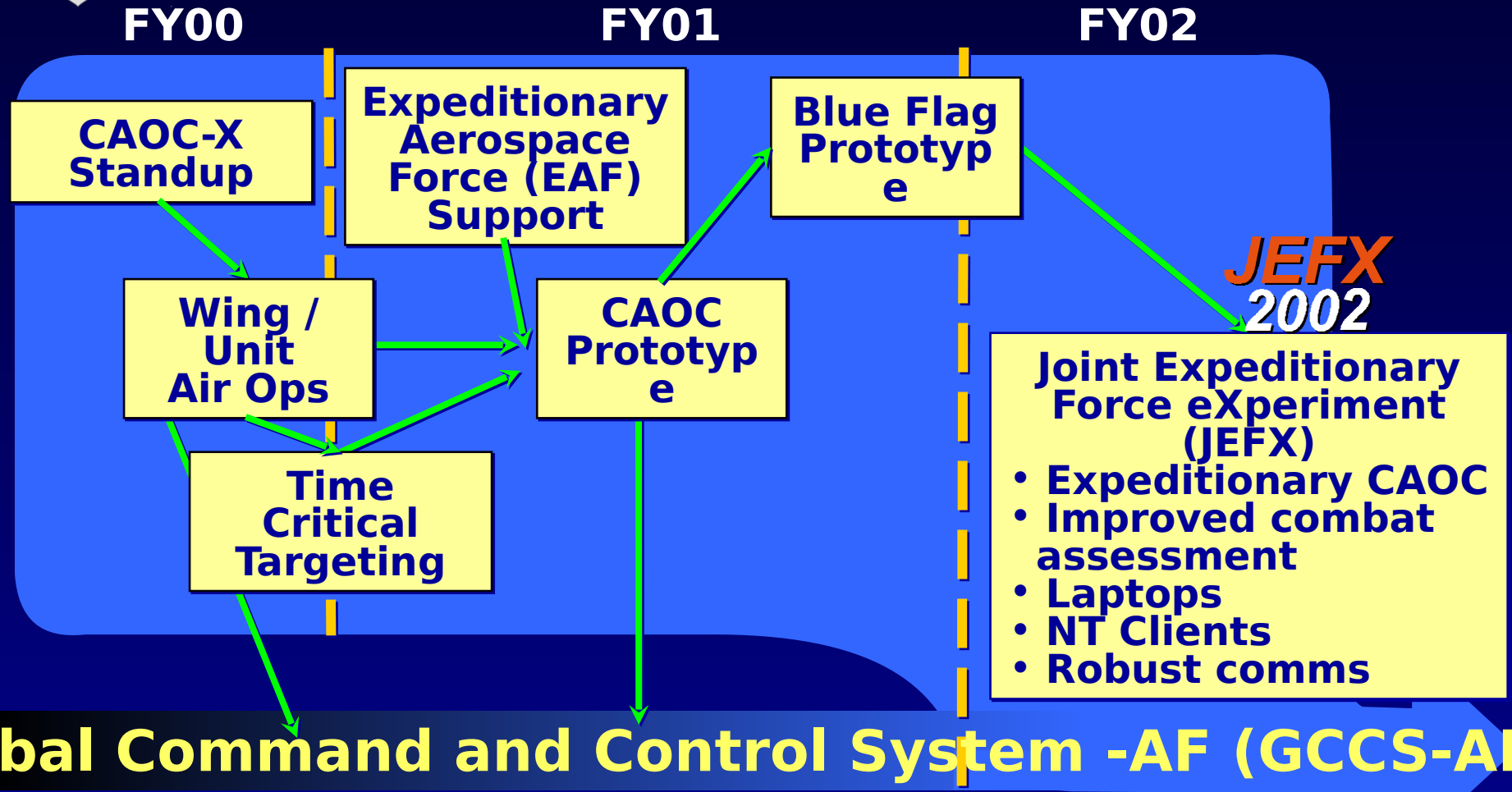
- Stand-up: 18 Sep 00 - 1 Apr 01
- Establish CAOC-X baseline for Air Tasking Order (ATO) production, dissemination, and execution
  - Ability to receive and process Moving Target Indicator (MTI) and Synthetic Aperture Radar (SAR) data
  - Initial NATO interoperability
  - Reduce planning cycle
  - Reduce footprint
  - Time Critical Targeting
  - Collaboration
  - Web Enabled Unit Level TBMCS

Theme – Desert Shift Support

CAOC-X Phase 2
Candidates For SDIPT Approval

- Wing to AOC status updating — publish & subscribe
- Guidance Apportionment & Targeting (GAT) without Stickies (DataWall)
- ISR Battle Management
- Enhanced target analysis
- Time Critical Targeting
- Collection management correlation
- Initial web-enabling of TBMCS force level & application consolidation

AOC Evolution Schedule



Technology gap *closed* by JEFX 02

Summary

- The CAOC is a Weapon System
- CAOC-X is the way ahead
- Government / Industry Team is a must

Questions?

Assessment of current toolset / CAOC-X systems	PLAN				EXECUTE			ASSESS		
	STRATEGY	GAT	MAAP	ATO PRODUCTION	FIXED TARGET	PLANNED DYNAMIC	TIME CRITICAL TARGETS	OPERATIONAL ASSESSMENT	COMBAT ASSESSMENT	PROCESS ASSESSMENT
TBMCS				✓	✓	✓				
Master Battle Planner		✓	✓	✓						
Joint Targeting Toolkit	✓						✓	✓	✓	
ISRBM	✓					✓	✓	✓	✓	
XML ATO				✓	✓	✓	✓			
Coal Warfighter	✓				✓	✓	✓	✓	✓	
Broadsword	✓				✓	✓	✓	✓		
JFACC Cockpit	✓						✓	✓		
IWS	✓	✓	✓		✓	✓	✓	✓		✓
ELVIS II					✓	✓	✓	✓		
SBMCS		✓	✓	✓	✓			✓		
NATO ICC	NATO INTEROPERABILITY									

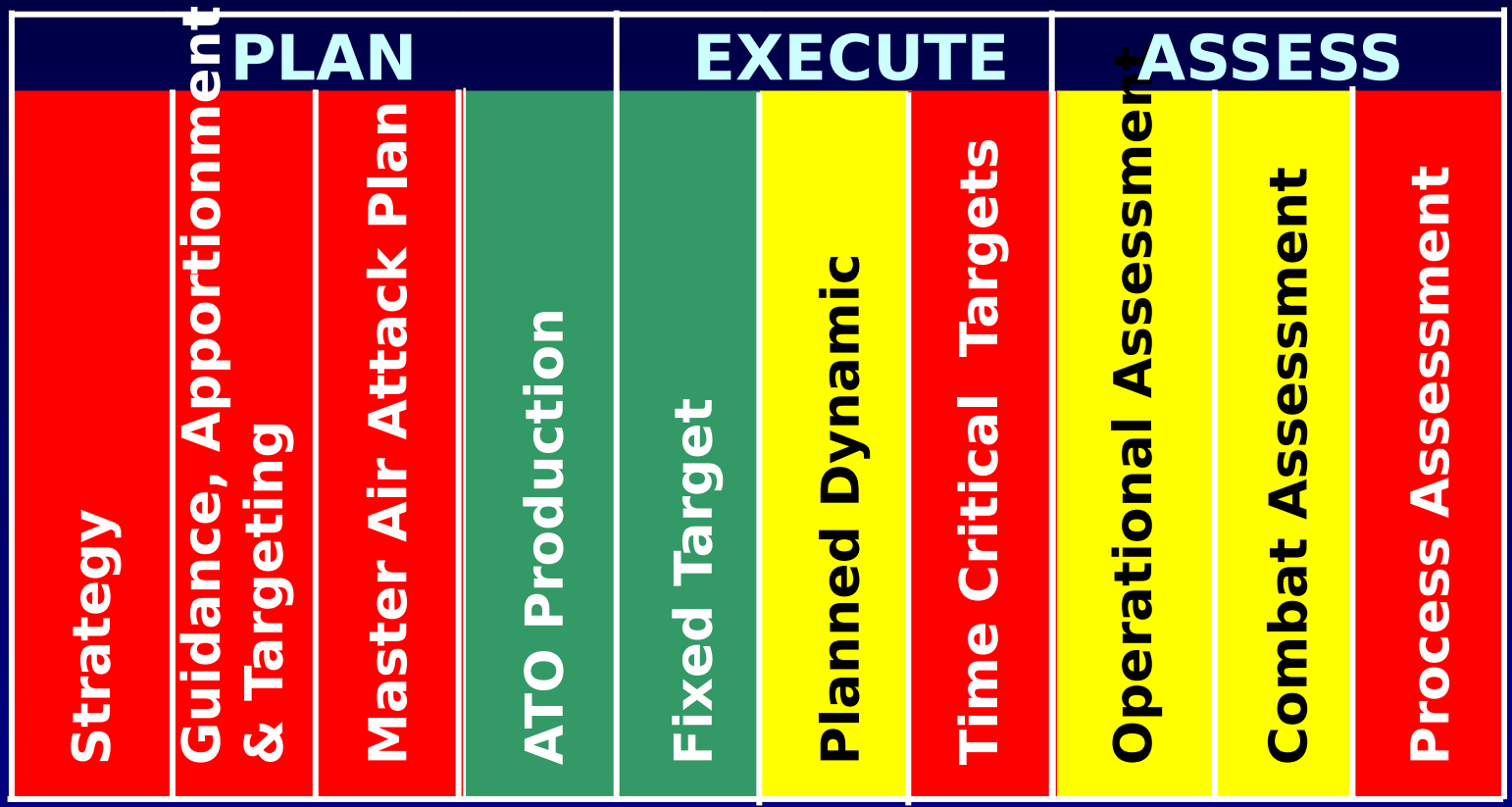
Current capability adequate

Current capability limited

Currently no integrated toolset

Checkmarks indicate applicability to processes

Assessment of Current Tools



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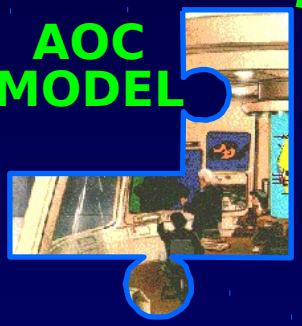
Building the Weapon System

CONOPS

ARCHITECTURES

AOC MODEL



SPIRAL DEVELOPMENT IPT

CAOC-X

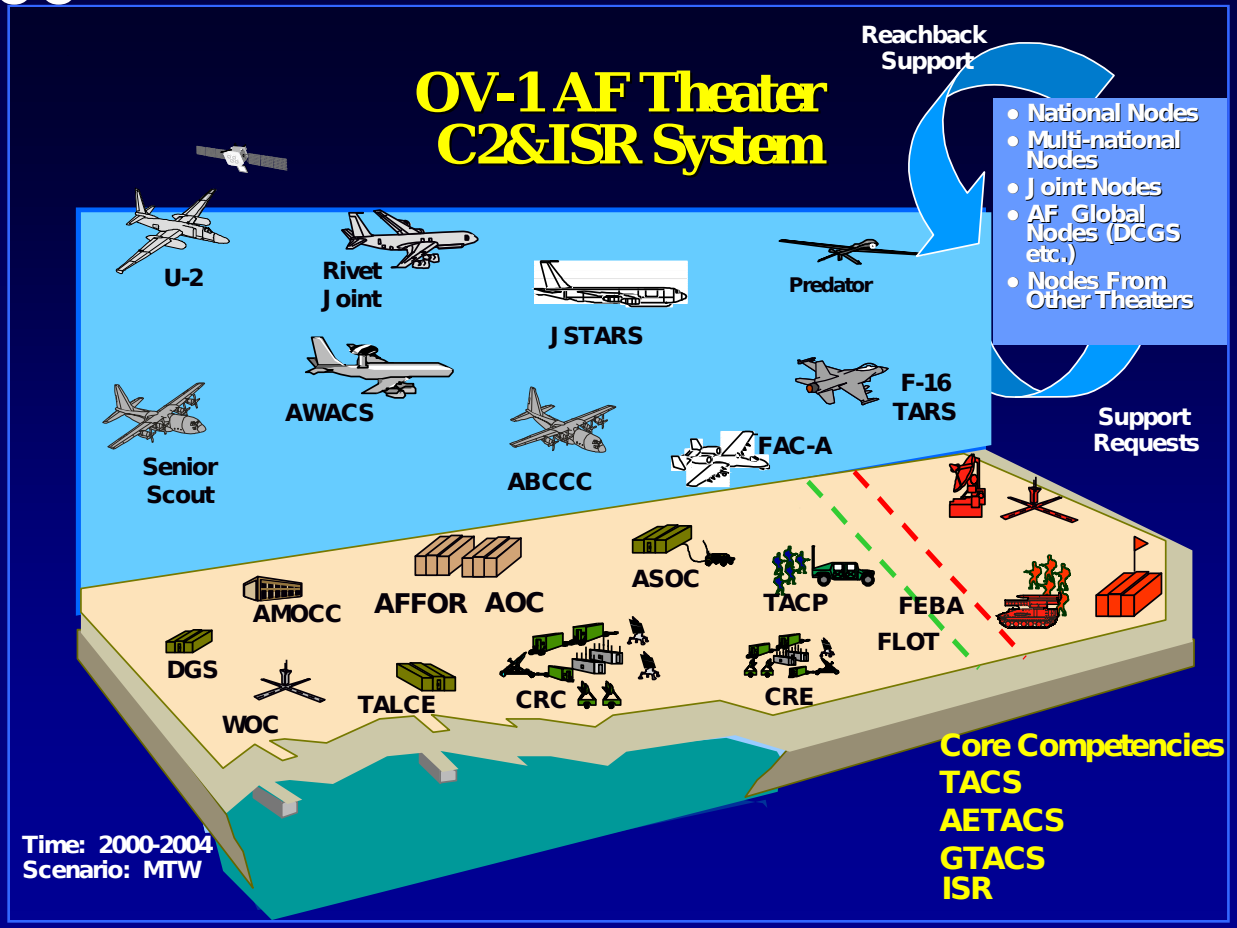
WARFIGHTING CAPABILITY

CONOPS Efforts

- AF C2&ISR CONOPS
  - "As-Is" (MAJCOM 2-digit coord)
  - "To-Be" (Nov 00)
- Theater Air Control System CONOPS (Nov 00)
- AF AOC CONOPS (MAJCOM/CC coord)
- CAF CONOPS for Integration of C2&ISR (MAJCOM 2-digit coord)
- CAF CONOPS for C2 Against Time Critical Targets (Updated 1 Qtr CY01)

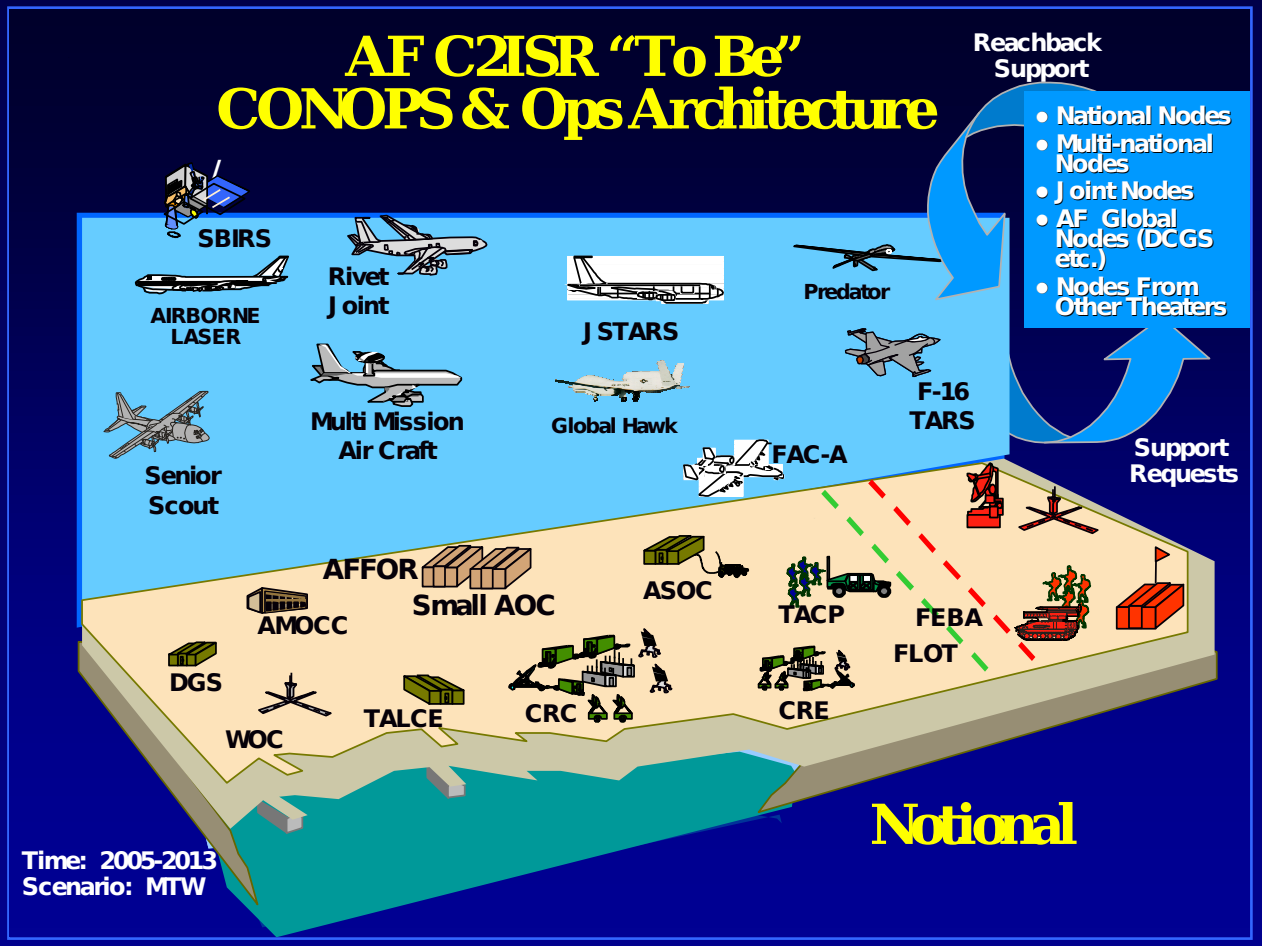
'As-Is' Operational Architecture

- Version 1.0 (Theater Focus) Released Aug 00
- AF theater C2&ISR nodes
- MTW focus
- 2000-2004 timeframe



'To-Be' Operational Architecture

- First Increment—Due 8 Dec 00
- AF theater C2&ISR capabilities
- MTW focus
- 2005-2013 timeframe



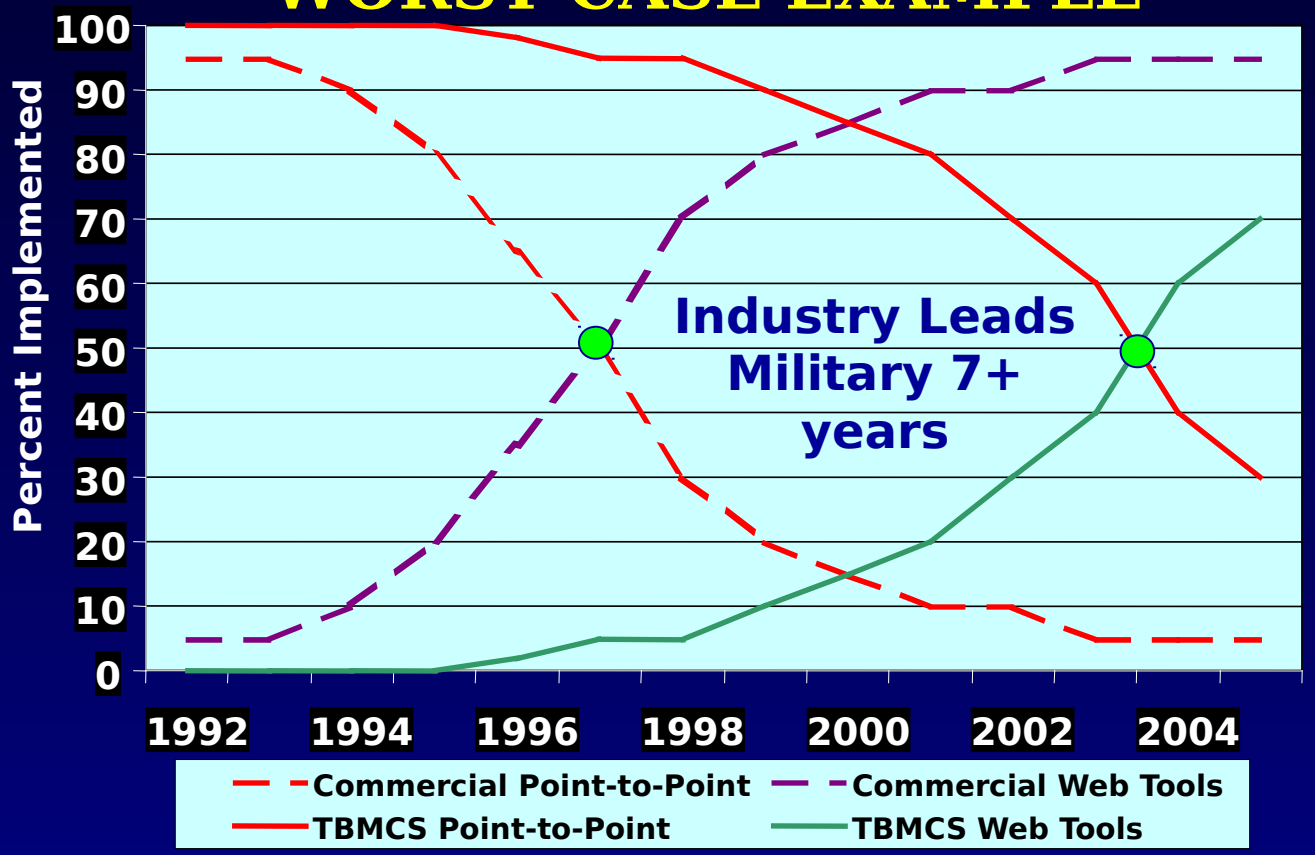
AOC Executable Model

- ESC built executable model of AOC
- Process based – models AOC CONOPS
- Now matching process model to ops architecture
- Next align systems architecture to ops architecture
- Will identify holes, bottlenecks, and redundancies

AOC SDIPT

- CAOC-X Phase I baseline agreed on
  - Primarily Desert Shift support
- AOC Baseline established
  - Common baseline of equipment with theater specific “extensions”
- Voting membership
  - Users, developers, testers
  - MAJCOM O-6 level

TBMCS DEVELOPMENT TIMELINE
WORST CASE EXAMPLE



On The Way Out

- USMTF Messages
- Manual Data Distribution
- Point-to-Point Data Push
- Unix

Evolutionary Path

- Web Services
- Publish/Subscribe
- Collaboration
- PC/NT

Source: AC2ISRC/CCT Analysis,

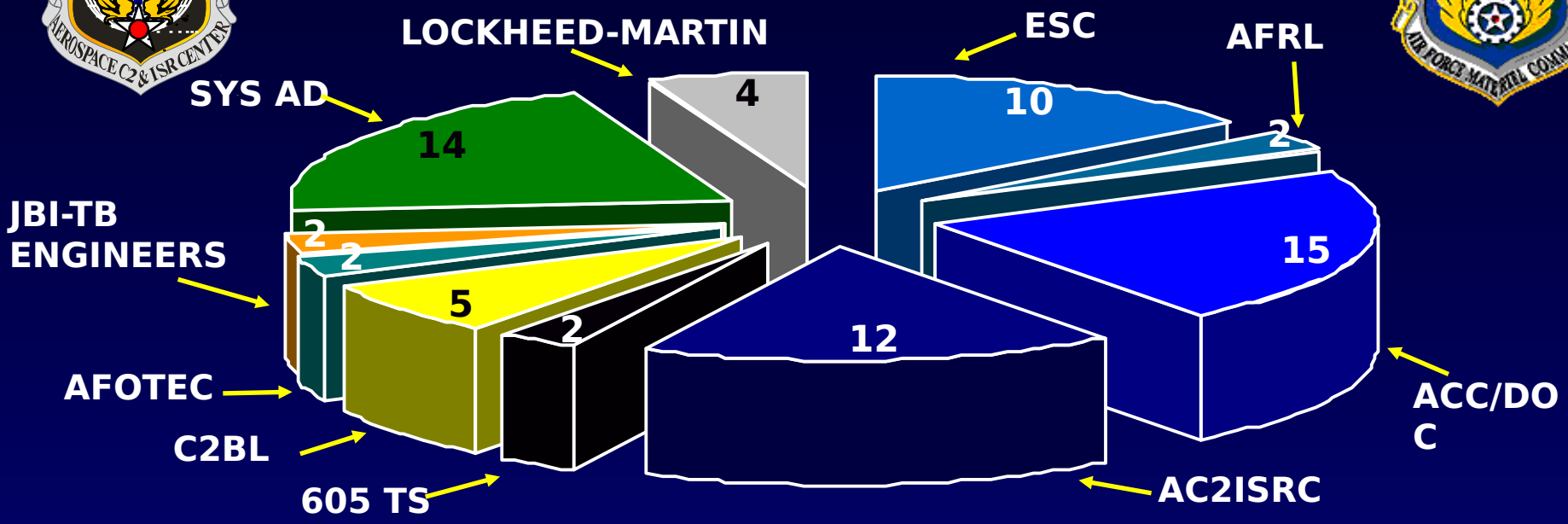
Lesson From Kosovo

"The single most important lesson learned from 'Kosovo' is the need to treat the AOC as a weapon system"

"The AOC needs to focus on commanding air power rather than administering the ATO."

- General Jumper, USAFE / CC, CORONA TOP, Jun 99

CAOC-X Manpower



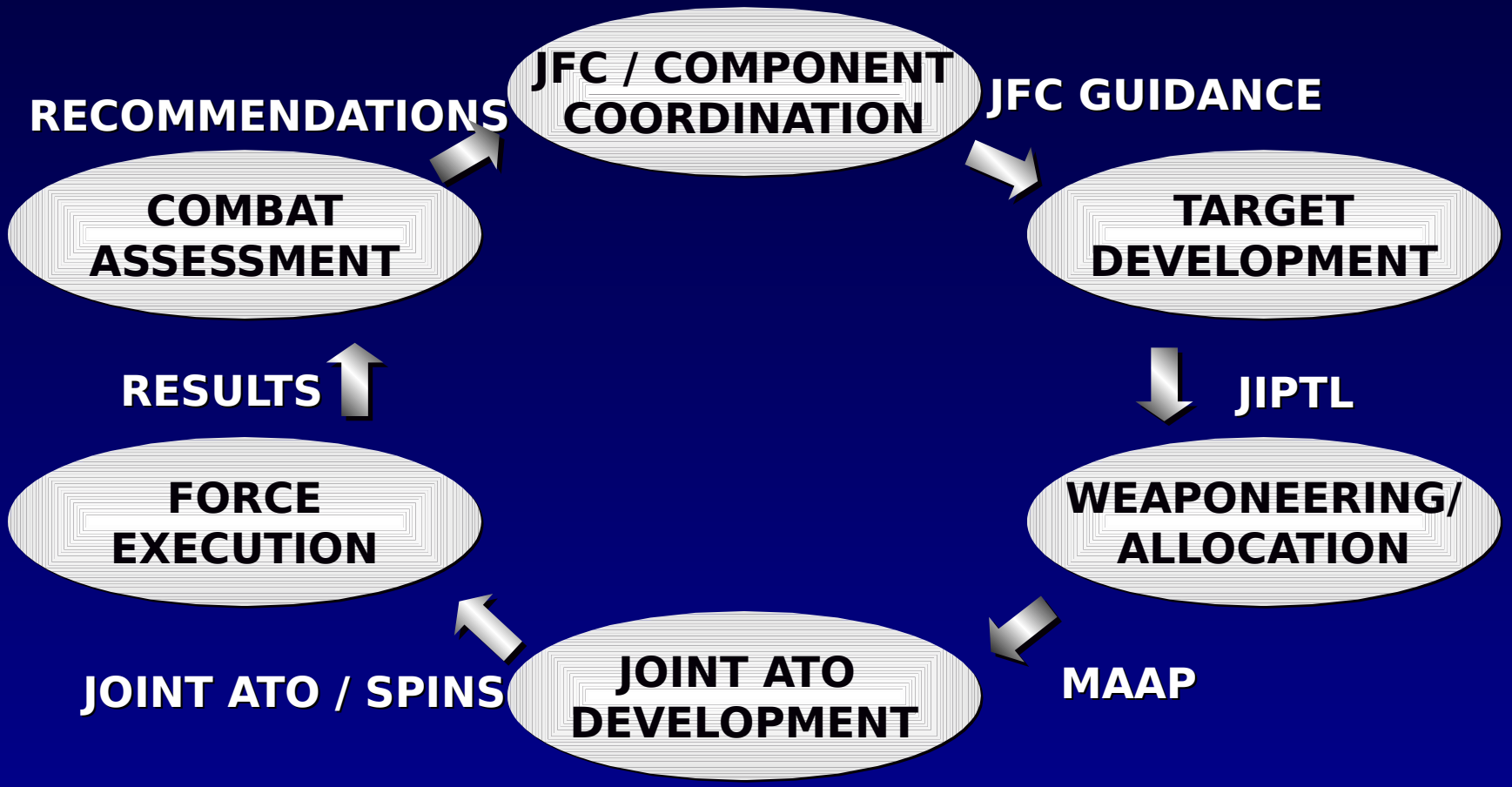
	OFFICER	ENLISTED	CONTRACTOR	TOTAL
ESC	2	0		8
AFRL	10			
ACC/DOC	0	0		2
AC2ISRC	2			
605 TS	2	1		12
C2BL	15			
AFOTEC	6	1		5
JBI-TB ENGINEERS	12			
SYS AD	1	0		1
LOCKHEED-MARTIN	2			
TOTAL	5	0		0
	5			
	1	0		1
	2			

AOC Weapon System

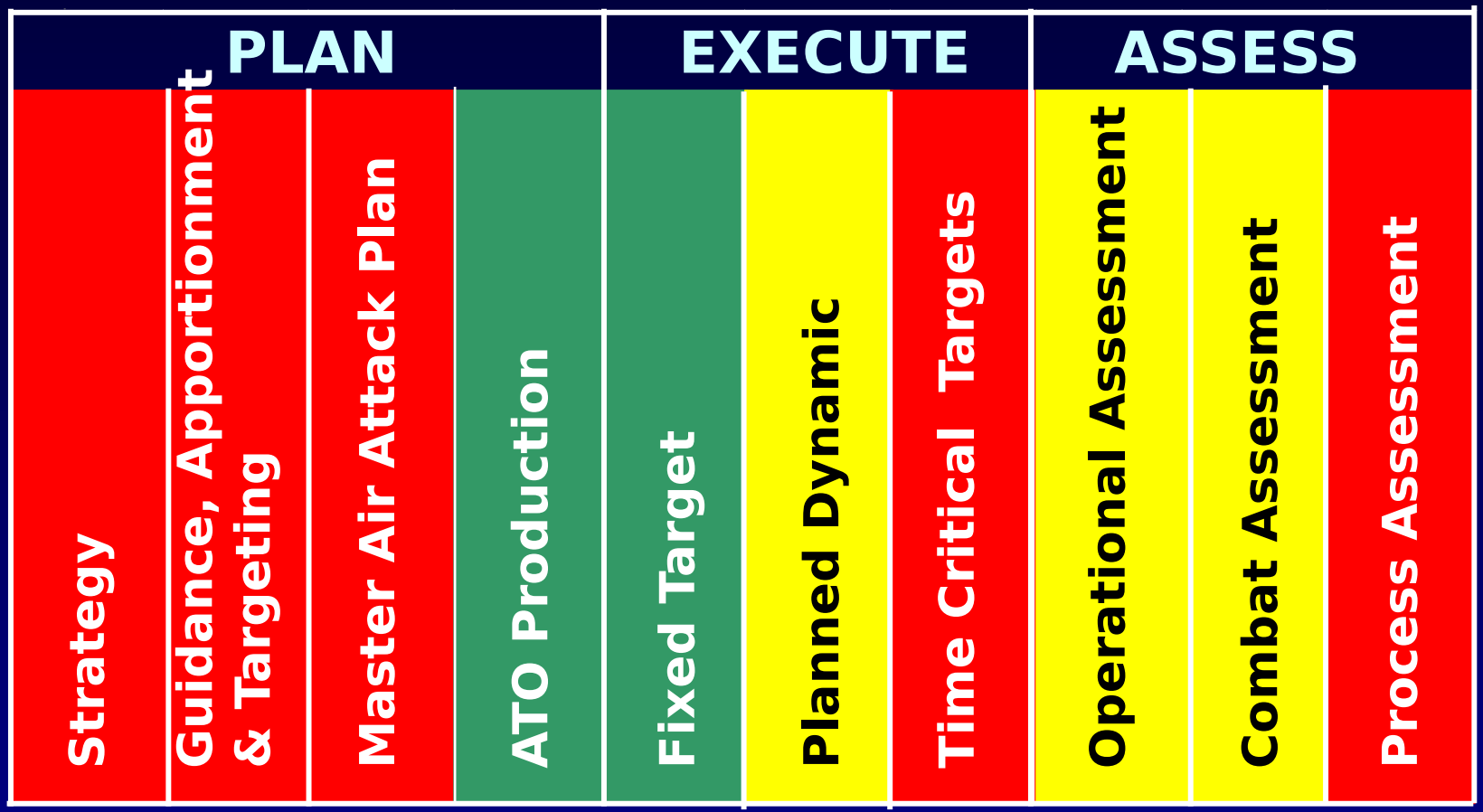
“I declare the AOC as an official weapons system today”

- General Ryan, CSAF, 8 Sep 00

ATO Cycle Model



Assessment of Current Tools



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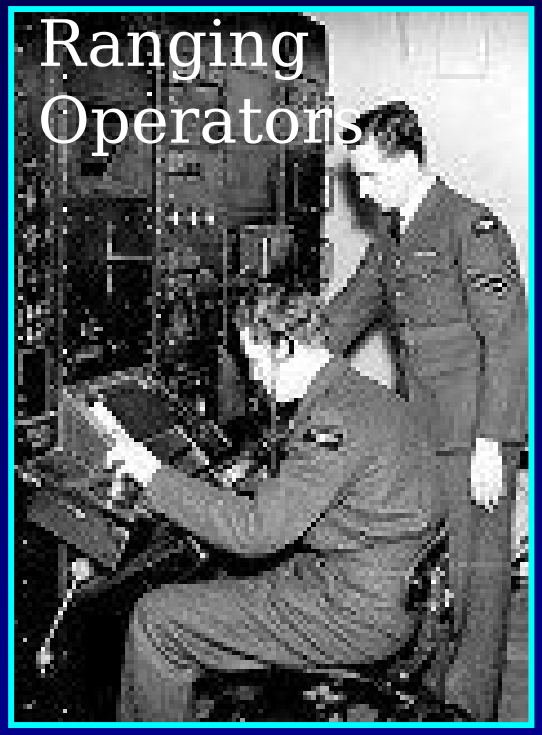
Battle of Britain

Radio Detection Ranging Operators

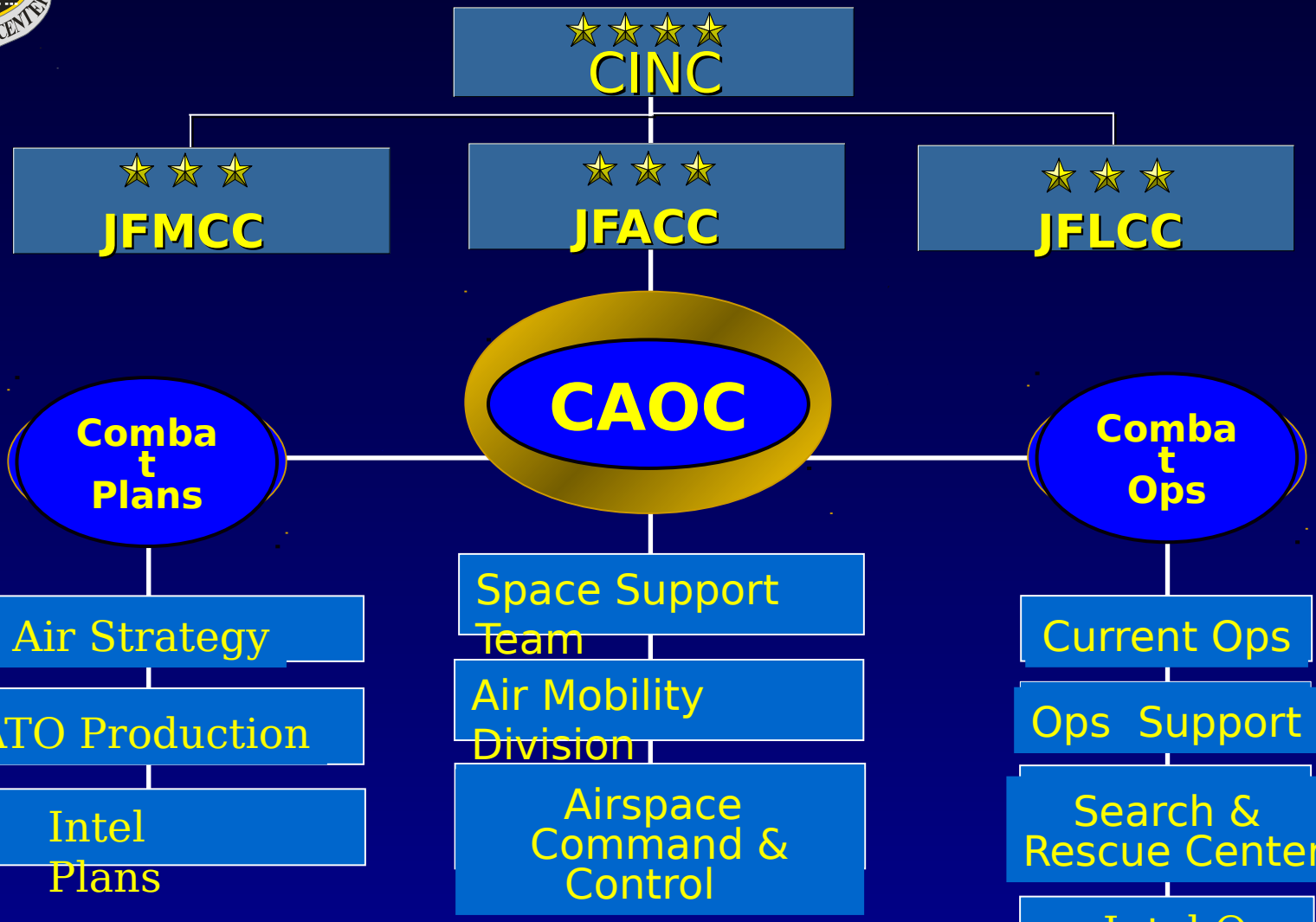


Hurricanes

Observers

Fighter Command Headquarters Filter and

Combined Aerospace Operations Cente



JFMCC = Joint Forces Maratime Component Commander

JFACC = Joint Forces Air Component Commander

Assessment of Current Tools

- Current capability adequate
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Strategy	PLAN
Guidance, Apportionment & Targeting	PLAN
Master Air Attack Plan	PLAN
Air Tasking Order Production	PLAN
Fixed Target	EXECUTE
Planned Dynamic	EXECUTE
Time Critical Targets	EXECUTE
Operational Assessment	ASSESS
Combat Assessment	ASSESS
Process Assessment	ASSESS